



# MATERIAL SAFETY DATA SHEET

(Essentially similar to U.S. Department of Labor Form OSHA-20)

Do Not Duplicate This Form. Request an Original

MAY 28 1982

F-4604



## I. PRODUCT IDENTIFICATION

PRODUCT	Hydrogen (High Pressure Gas)	DPM 153
CHEMICAL NAME	Hydrogen	SYNONYMS -----
FORMULA	H <sub>2</sub>	CHEMICAL FAMILY -----
TRADE NAME	-----	MOLECULAR WEIGHT 2.016

## II. HAZARDOUS INGREDIENTS

See Section V for TLV information

## III. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	-252.9°C (-423.2°F)	FREEZING POINT	-259.1°C (-434.4°F)
SPECIFIC GRAVITY (H <sub>2</sub> O = 1)	Gas	VAPOR PRESSURE AT 20°C.	Gas
VAPOR DENSITY (air = 1)	0.0695	SOLUBILITY IN WATER, % by wt.	Negligible
PER CENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	NA
APPEARANCE AND ODOR	Colorless, Odorless		

## IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	Flammable Gas	AUTOIGNITION TEMPERATURE	585°C (1085°F)
FLAMMABLE LIMITS IN AIR, % by volume	LOWER 4%	UPPER 75%	

### EXTINGUISHING MEDIA

CO<sub>2</sub>, Dry Chemicals, water spray or fog.

### SPECIAL FIRE FIGHTING PROCEDURES

Evacuate all personnel from danger area. Immediately cool containers with water spray from **maximum distance**, taking care **not** to extinguish flames. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive re-ignition may occur. Use self-contained breathing apparatus. Stop flow of gas if without risk while continuing cooling water spray. Remove all containers from area of fire if without risk. Allow fire to burn out.

### UNUSUAL FIRE AND EXPLOSION HAZARDS

Flammable gas. Flame is nearly invisible. Escaping gas may ignite "spontaneously". Hydrogen has a low ignition energy. Fireball is formed if gas cloud is ignited immediately after release. Forms explosive mixtures with air and oxidizing agents. Container may rupture due to heat of fire. Do not extinguish flames due to possibility of explosive re-ignition. Flammable gas may spread from spill. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with approved explosion meter. No part of a container should be subjected to a temperature higher than 52 C (approximately 125°F). Most containers are provided with a pressure relief device designed to vent contents when they are exposed to elevated temperature.

### EMERGENCY PHONE NUMBER

IN CASE OF EMERGENCIES involving this material, further information is available at all times at this telephone number:

304: 744-3487

For routine information contact your local Linde Supplier.

While Union Carbide Corporation believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the tests conducted, the data are not to be taken as a warranty or representation for which Union Carbide Corporation assumes legal responsibility. They are offered solely for your consideration, investigation, and verification. Any use of these data and information must be determined by the user to be in accordance with applicable Federal, State, and local laws and regulations.

UNION CARBIDE CORPORATION ■ LINDE DIVISION ■ 270 PARK AVENUE, NEW YORK, N.Y. 10017

BOE-C6-0208320

F-4604

## V. HEALTH HAZARD DATA

**THRESHOLD LIMIT VALUE** Simple asphyxiant (ACGIH – 1977)**EFFECTS OF OVEREXPOSURE AND EMERGENCY AND FIRST AID PROCEDURES**

Hydrogen acts as an asphyxiant by displacing oxygen, and may cause atmospheres deficient in oxygen when ventilation is inadequate. Hydrogen may cause injury from fires and explosions.

**SYMPTOMS OF ASPHYXIA:** Headache, breathing and pulse rates increased, difficult breathing, perspiration, dizziness, ringing in ears, lips blue, tremors and weakness, fatigue upon exertion, drowsiness, nausea and vomiting, unconsciousness.

**TREATMENT OF ASPHYXIA:** Remove from oxygen-deficient atmosphere. If not breathing, administer artificial respiration, preferably mouth-to-mouth. Call a physician. Keep under medical observation for 24 hours if rendered unconscious due to oxygen-deficiency.

**TREATMENT FOR INJURIES FROM BURNS:** Cover burns with dry sterile dressing. Place under care of a physician.

## VI. REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
Unstable	Stable	
	X	See Section IX

**INCOMPATIBILITY (materials to avoid)**

Oxygen, oxidizing agents

**HAZARDOUS DECOMPOSITION PRODUCTS**

None

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur	Will not Occur	
	X	-----

## VII. SPILL OR LEAK PROCEDURES

**STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED**

**DANGER:** Forms explosive mixtures with air (see Section IV).

Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if without risk. Reduce gas with fog or fine water spray. Shut off leak if without risk. Ventilate area of leak or move leaking container to well-ventilated area.

**CAUTION:** Flammable gas may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.

**WASTE DISPOSAL METHOD**

Prevent waste from contaminating surrounding environment. Keep personnel away.

Call supplier for disposal information.

**VIII. SPECIAL PROTECTION INFORMATION****RESPIRATORY PROTECTION (specify type)**

Self-contained breathing apparatus where needed.

<b>VENTILATION</b>	<b>LOCAL EXHAUST</b>	Explosion-proof system is acceptable.
	<b>MECHANICAL (general)</b>	Inadequate
	<b>SPECIAL</b>	-----
	<b>OTHER</b>	-----

**PROTECTIVE GLOVES** Preferred for cylinder handling.**EYE PROTECTION** Safety glasses**OTHER PROTECTIVE EQUIPMENT** Metatarsal shoes for cylinder handling.**IX. SPECIAL PRECAUTIONS****DANGER:** Flammable gas under high pressure.

Use piping and equipment adequately designed to withstand pressures to be encountered. May form explosive mixtures with air.

Ground all equipment. Only use spark-proof tools and explosion-proof equipment. Keep away from heat, sparks and open flame. Store and use with adequate ventilation at all times. Use only in a closed system. Close valve when not in use and when empty.

**PREVENT FIRE** — Protect cylinders from direct sunlight and store in well-ventilated area. Protect containers from physical damage. Preferably, isolate from cylinders of oxygen and chlorine. Do not load together with explosives, poisons, radioactive materials and organic peroxides.

In event of fire, cool cylinders with water spray from safe distance.

**OTHER HANDLING AND STORAGE CONDITIONS**

Keep away from oxidizing agents.

**UNION CARBIDE CORPORATION  
LINDE DIVISION**

**GENERAL OFFICES: NEW YORK  
OFFICES IN PRINCIPAL CITIES**



**LINDE  
DIVISION**

**Lithographed in U.S.A.  
F-4604 89-0927 1/80 1M**

**BOE-C6-0208323**